SPECIAL FOCUS ON TOTAL OWNERSHIP COST

Acquisition Reform Update

January 1999

USD(A&T) Sets Goals for Total Ownership Cost

The Defense Systems Affordability Council (DSAC) has challenged the Department of Defense research, development, acquisition, and support community to reduce the total ownership costs, referred to as R-TOC, of defense systems. The goal of this R-TOC initiative is to free up funding for modernization and recapitalization of weapon systems. The DSAC, chaired by Dr. Jacques Gansler, Under Secretary of Defense (Acquisition & Technology), makes decisions based on a consensus of its members—the Service Acquisition Executives and other senior policy makers from the acquisition, logistics, comptroller, programming, and requirements communities.

Until recently, each Service had a slightly different interpretation of what comprised total ownership cost (TOC). In his November 13, 1998 memorandum defining TOC and the responsibilities of the program manager, Gansler provides the DoD acquisition community a clear understanding of what is meant by TOC in its broadest context. The memorandum also provides a definition of defense systems TOC that directly impacts program managers and the acquisition work force. This definition is consistent with life cycle cost (LCC). The responsibility of program managers in support of reducing DoD TOC is the continuous reduction of LCC for their systems.

DoD TOC *is the sum of all financial resources necessary to organize, equip, sustain and operate military forces sufficient to meet national goals in compliance with all laws, all policies applicable to DoD, all standards in effect for readiness, safety, and quality of life, and all other official measures of performance for DoD and its Components. DoD TOC is comprised of costs to research, develop, acquire, own, operate,*

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Captain Vargo Leads Navy TOC Team

Captain Jeanne Vargo, SC, USN, joined the Acquisition Reform Office three months ago to lead the Department of the Navy (DoN)'s Total Ownership Cost (TOC) efforts. Vargo is responsible for setting the DoN vision for TOC, identifying acquisition reform initiatives that support TOC reduction, and assisting DoN program offices in meeting DoD TOC goals.

DoN TOC Vision:

"Every Navy/Marine Corps manager understands and continuously works to reduce his/her costs while improving quality, efficiency, and performance."

Vargo previously served on the staff of the Chief of Naval Operations as Head, Acquisition Logistics Integration Branch (N432). She led the Navy's Commercial Operating and Support Savings Initiative (COSSI) team that selected commercial technology insertion projects for fielded systems estimated to save over $1 billion over an eight year payback period. As reviewer of Operational Requirements Documents (ORDs) for N4, she instituted the requirement for inclusion of operating and support costs as a performance parameter in all new ORDs. Prior to this, Vargo was assigned as the Business Financial Manager for the E-2C Program Office (PMA-231). She is a member of the acquisition work force, a graduate of the Industrial College of the Armed Forces, and holds a MBA with distinction from the University of Pennsylvania Wharton School of Business.

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TOC Goals Set

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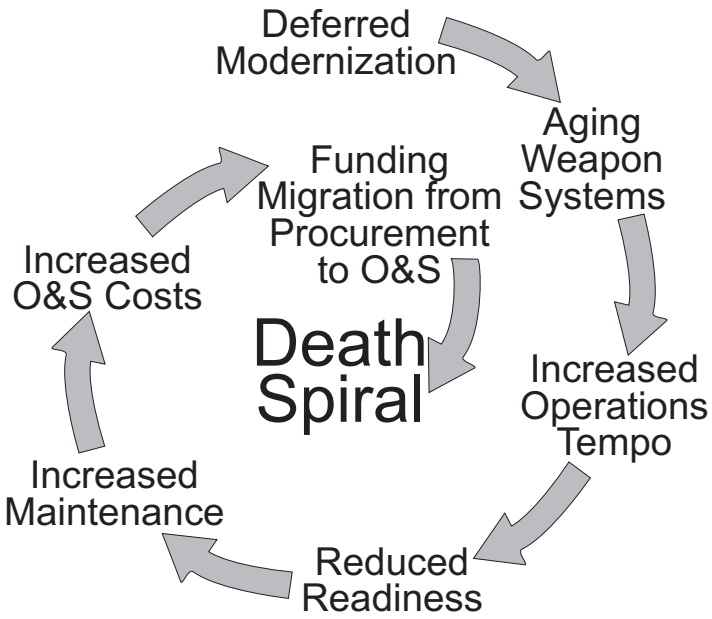
and dispose of weapon and support systems, other equipment and real property, the costs to recruit, retain, separate and otherwise support military and civilian personnel, and all other costs of business operations of the DoD.

***Defense Systems TOC** (consistent with the DoD 5000.4M) is defined as Life Cycle Cost (LCC). LCC includes not only acquisition program direct costs, but also the indirect costs attributable to the acquisition program (i.e., costs that would not occur if the program did not exist). For example, indirect costs would include the infrastructure that plans, manages, and executes a program over its full life and common support items and systems.*



The DSAC believes that costs in all TOC categories are too high and can be reduced substantially through better emulation of the best practices of the public and private sectors. They have set demanding TOC top-level objectives for the Department.

While Navy Total Obligational Authority (TOA) is no longer increasing, the DoN is faced with increasing operation and support (O&S) costs for their aging weapon systems. Says Gansler, "The dilemma we face right now involves competing—and seemingly unlimited—demands for limited resources. We simply cannot afford all that we would like to do—and, on our present path, even all that we must do. With fixed resources, we have resorted to 'robbing Peter to pay Paul;' taking from future investments in modernization to maintain current readiness…" During the '90's, constrained resources forced the DoN to defer modernization. This deferment resulted in an aging Fleet requiring increased maintenance, which, in turn drives O&S costs up and readiness down. With TOA fairly constant, increased O&S costs draw more funds from procurement accounts, resulting in more deferred modernization—a vicious cycle. Gansler goes on to say, "Unfortunately, we are trapped in a 'death spiral.' The requirement to maintain our aging equipment is costing us much more each year: in repair costs, down time, and maintenance tempo. But we must keep this equipment in repair to maintain readiness. It drains our resources—resources we should be applying to modernization of the traditional systems, and development and deployment of the new systems. So, we stretch out our replacement schedules to ridiculous lengths and reduce the quantities of the new equipment we purchase—raising their costs and still further delaying modernization."

The Navy's TOC efforts are directed toward breaking out of this cycle by facilitating cost reduction across the Service and reinvestment of the savings into force modernization.

DSAC TOC Objectives

1) *For systems in acquisition, surpass or achieve aggressive "Cost as an Independent Variable" unit cost and total ownership cost targets (that are 20-50% below historical norms) for at least 50% of programs by FY 2000.*
2) *For fielded systems, reduce the logistics support cost per weapon system per year compared to FY 1997 baselines as follows: 7% by FY 2000; 10% by FY 2001; and a stretch target of 20% by FY 2005.*

Department of the Navy Identifies TOC Initiatives

In May 1998, former Assistant Secretary of the Navy for Research, Development and Acquisition, John Douglass, directed the implementation of total ownership cost (TOC) baselines for all Department of the Navy (DoN) acquisition programs. He directed that program managers establish TOC objectives and thresholds including the identification of specific TOC reduction initiatives. In Fall 1998, the Defense Systems Affordability Council (DSAC), chaired by Under Secretary of Defense for Acquisition and Technology, Dr. Jacques Gansler, identified reducing the total ownership cost of defense products as one of its top three goals.

DSAC Top Level Goals for the Department

- Field high quality defense products quickly; support them responsibly
- Lower the total ownership cost of defense products
- Reduce the overhead cost of the acquisition and logistics infrastructure

Captain Jeanne Vargo, the DoN TOC leader has established four initiatives for FY99:

1) **Educate the work force on TOC initiatives/tools**. During the Fall 1998 PEO/SYSCOM Conference, it became apparent that while most program teams were aware of their cost drivers, a greater understanding of the tools available to assist them in reducing those costs was needed. Training is being offered at the DoN Acquisition Center of Excellence (ACE), Washington, DC, on a quarterly basis to present TOC theory, tools, and practical applications.

2) **Provide in-depth assistance to program offices in identifying cost drivers and developing investment initiatives.** A TOC Tiger Team is being formed to provide program offices with a catalyst for thought stimulation and assistance in creating their methodology for TOC reduction. The team will provide a "quick look" survey of where the targeted program needs additional support and will assist the program team in tailoring that support whether it be through process modeling, tools training, or hands-on help in calculating investment initiatives for TOC reduction. Look for further details on the DoN Acquisition Reform home page regarding team formation and the call for acquisition programs to participate.

3) **Lead the gainsharing initiative on incentives.** The need to incentivize program managers to take TOC reduction risks is critical to success. Vargo characterizes the DoD budget process as "one that rewards those who propose savings with a budget cut." The gainsharing initiative addresses how to remove this disincentive by allowing innovators and other stakeholders (e.g., resource sponsors, resource managers, fleet/type commanders, and other affected parties) to retain a portion of actual savings to be re-invested in other unfunded program needs. Plans call for a war game to test the concept in late winter.

4) **Provide policy guidance.** There is a need for greater coordination in developing policy and disseminating TOC information. The DoN Acquisition Reform Office (ARO) will take over leadership of the TOC Goal Management Board (TOC GMB). The members of this forum will serve as the subject matter experts to assist in TOC policy development and implementation.

TOC reduction is an essential part of the DoN's force modernization strategy. It requires the full commitment of both the acquisition community and its supporting infrastructure. Your contributions are important to make this happen.

Program Maturity Determines TOC Approach

The acquisition phase of the program determines the approach that program managers use in addressing total ownership cost (TOC) reduction efforts. For new acquisition programs (pre-Milestone III ACAT programs) or those undergoing major modernization, TOC reduction focuses on changing *what we acquire*; this is most often accomplished by applying Cost as an Independent Variable (CAIV). There are also cost reduction opportunities in *how we acquire and operate systems*. This involves both new systems acquisitions and fielded systems. In this realm, cost reduction focuses on process improvements and more traditional commercial efficiency and re-engineering tools.

CAIV is essentially the reduction of TOC by examining tradeoffs between cost and performance. CAIV utilizes standard engineering tools and methods to generate innovative and "out-of-the-box" alternatives in the trade process. These tools include integrated product teams, integrated digital environments, value engineering, quality function deployment, quick turn-around trade-off tools, specialized costing techniques (e.g., cost response curves, performance estimating relationships, systems dynamics modeling), specialized cost databases (e.g., Cost of Manpower Estimating Tool (COMET) and Visibility and Management of Operating and Support Costs (VAMOSC)), greater reliance on less expensive alternatives (e.g., commercial-off-the-shelf (COTS) equipment), and increased use of

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Maturity Determines Approach

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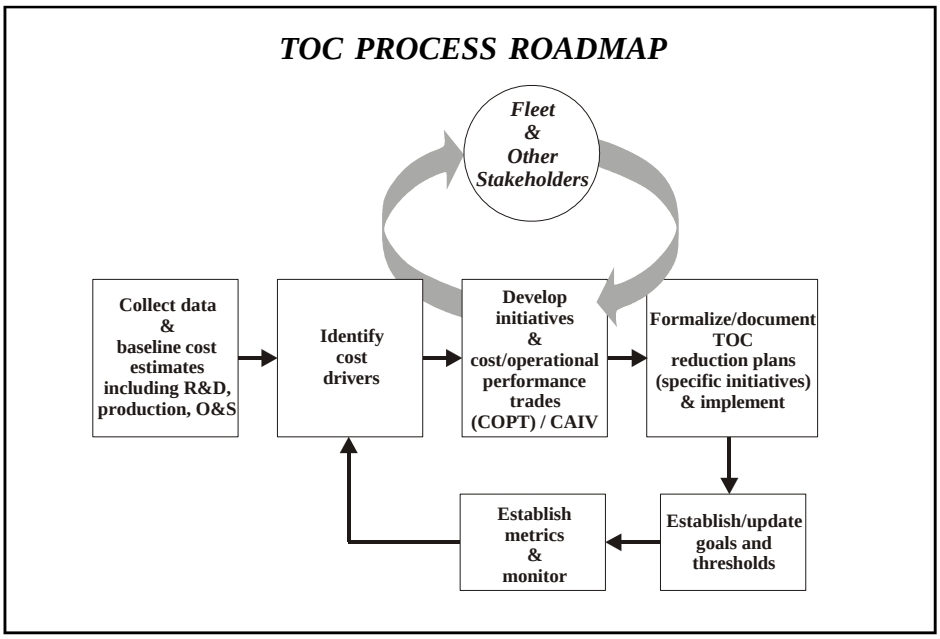
metrics (e.g., earned value management (EVM)) and incentives.

TOC reduction for fielded systems generally involves reducing the cost of processes or methods of operation. This reduction comes about by changing how we operate and support systems. Techniques such as activity-based costing and management (ABC/M) are combined with information available from specialized cost databases like VAMOSC to provide an understanding of baseline costs attributable to the system. VAMOSC provides a product-oriented view of direct and some indirect costs of fielded weapons systems. ABC/M gives program managers a functionally oriented view of costs to enable a better understanding of infrastructure and other indirect costs. Once these costs are identified, techniques such as business process re-engineering, open systems architecture, commercial technical insertion, and contractor logistics support (CLS) are employed to identify and implement more cost-effective ways of doing business.



The Naval Air Systems Team recently published a TOC implementation guidebook on the World Wide Web that illustrates the process to identify cost drivers, establish baselines, and define reduction initiatives. The guidebook is intended to assist program managers, integrated product teams, and cost analysts in developing comprehensive programs for reducing TOC. It provides templates and answers to frequently asked questions (FAQs) that are useful for understanding how to approach TOC reduction.

TOC Reduction Tools

Visibility and Management of Operating and Support Costs (VAMOSC) is a DoD-directed Navy database providing easily-retrievable, historical operating and support (O&S) cost data for weapon systems organized in a standard cost element structure: Mission Personnel, Unit Level Consumption, Intermediate Maintenance, Depot Maintenance, Contractor Support, Sustaining Support, and Indirect Support. The DoN VAMOSC database includes these costs for 217 ship, aircraft, electronics, missile, torpedo, and automated information system types, as well as five Marine Corps vehicle types. Depending on the system type, the database includes up to fourteen years of historical data. The Naval Center for Cost Analysis (NCCA) manages the DoN VAMOSC database.

Cost Response Curves (CRCs) and **Performance Estimating Relationships (PERs)** demonstrate the response of total system cost to specific performance parameters. Use of CRCs allows decision-makers to experiment with the impact of changing operational parameters on cost. They are built from cost models and reproduce the results of these models faithfully, and quickly. PERs are cost estimating relationships (CERs) that use performance parameters as independent variables. They can be constructed the ordinary way, or can be composed of equations that are calibrated to conventional high-fidelity CERs.

Systems Dynamics cost models allow for easy visualization of the reaction of the system to changes in performance parameters. They enable quick what-if drills since they incorporate influence equations involving many variables. For example, the Naval Center for Cost Analysis (NCCA) s Operating & Support Cost Analysis Model (OSCAM) is a systems dynamics model for assessing the impact of alternative maintenance strategies and operating policies on the cost and availability of Navy ships and shipboard systems. This model addresses all the major O&S cost elements included in the VAMOSC database.

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Multi-Mission Helicopter Program Tackles TOC Reductions

The first step in reducing TOC is to know what your costs are. Like a lot of programs, the Multi-Mission Helicopter Program Office (PMA-299), located at Naval Air Station Patuxent River, knew what some of their costs were, but had never looked at them in a comprehensive way. A little over a year ago, the Deputy Chief of Naval Operations (Resources, Warfare Requirements and Assessments) asked the question, "Does the Helicopter Master Plan save us any money?" Intuitively, replacing older helicopters with new or re-manufactured ones seems like it should save money, but amazingly enough, no one had ever nailed down exactly how much.

PMA-299 is currently responsible for aircraft spanning the entire life cycle. It supports 280 operational H-60 aircraft as well as development and production of the CH-60S and SH-60R. The Navy's Helicopter Master Plan (HMP) is a plan to reduce the current eight Type/Model/Series helicopters to three versions of the H-60, the HH-60H, CH-60S, and the SH-60R.

The task of building a model and putting a number on the savings fell to PMA-299. The model compares the cost of implementing the HMP and operating three type/model/series until the year 2020 with the cost of keeping the current inventory of eight type/model/series aircraft flying until 2020. The model includes CH-60S and SH-60R production budgets, operating and support (O&S) costs, and force structure costs. The O&S costs are based on information found in the DoN's Visibility and Management of Operating and Support Costs (VAMOSC) database. Force structure costs are those costs required to keep an aircraft flying that do not recur on an annual basis (see box on page 6). Inflation is applied to all cost elements. Aircraft aging factors are applied to specific O&S cost elements, based on Air Force and NAVAIR studies.

Identifying current costs was just the first step for PMA-299 in implementing TOC reduction within their program. Knowing how to affect your cost drivers is the important next step in the process. PMA-299 Program Manager Capt. Larrie Cable advised, "During the process of looking for TOC reductions, it was crucial for my team to use technology insertion and consider new, innovative ways of doing business." PMA-299 employs a wide range of acquisition management tools and processes to come up with cost reductions. These include electronic commerce and electronic digital interchange, earned value management, TOC cost models, Affordable Readiness Initiatives, active risk management and a World Wide Web-based direct customer communications including a Fleet readiness desk.

The original cost model was automated to enable rapid and easy evaluation of life cycle cost decision alternatives. The automated model allows the user to run "what-if" scenarios by changing the inflation rate, aircraft aging factor, procurement schedules for the CH-60S and SH-60R, and O&S cost factors. The resulting cost analysis tool has been approved by NAVAIR's Cost Department. The model enables the accurate and complete assessment of H-60 life cycle costs, and easily translates into TOC tracking, initiative evaluation, and reduction. Some

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...more TOC Tools

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Commercial-Off-the-Shelf (COTS) equipment insertion is mandated to the extent possible in DoD 5000. COTS planning requires careful assessment of technology refreshment and obsolescence, as well as the costs for future replacement systems. The Naval Surface Warfare Center (NSWC) Crane Division has developed a system of analysis for COTS insertion in cooperation with NCCA.

Earned Value Management (EVM) is a system for contract progress management that addresses both indirect costs (pay allowances and "variable indirect" costs and produces near-real-time reports of cost and schedule variances, as well as an Estimate At Completion (EAC). EVM is a particularly important metric for risk management, and although it is no substitute for careful management, it often produces the first warning of impending problems in a contract.

Cost of Manpower Estimating Tool (COMET) is a personnel cost model that addresses both direct costs (pay and allowances) and "variable indirect" costs (personnel costs associated with traditional training, supporting, locating and recruiting functions). The model provides these costs by pay grade, across enlisted ratings and officer communities. COMET supports a variety of types of manpower cost analyses, including manpower vs. hardware trade-off analysis.

Open Systems Architecture (OSA) involves "... Commercial items that use open standards as their primary interface standards." OSA is characterized by multiple suppliers, commercially-supported practices, products, specifications & standards. Open systems equipment selection is based on performance, cost, industry acceptance, long-term availability and supportability, and upgrade potential.

Multi-Mission Helo

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examples of PMA-299 TOC reduction initiatives include:

- **Corrosion prevention compounds**: Apply corrosion preventative compounds as part of depot maintenance. Reduces costs associated with corrosion prevention and correction.
- **Interactive Electronic Technical Manuals**: Replace paper technical manuals with electronic ones. Reduces cost of publishing paper manuals, eventually will enable cost reductions in training as expert systems are fielded.
- **Health and Usage Monitoring System:** Enhance safety and reduce life cycle costs through the continuous monitoring of aircraft performance and vibration parameters inflight and through a ground-based automated maintenance environment. Reduces cost through decreased parts wear, decreased parts usage, and reduced number of maintenance flights.

Many of these initiatives are financed with "OPM"—or what Capt. Cable refers to as "Other People's Money"—such as the DoD-sponsored Commercial Operations and Support Savings Initiative (COSSI) and Logistics Engineering Change Proposal (LECP) programs. Programs such as these give program managers greater leverage in investing in TOC reduction initiatives.

Incidentally, the Helicopter Master Plan (HMP) ended up being $21 billion cheaper than keeping the older aircraft flying. Upon full implementation of the HMP, PMA-299 will be the sole Navy helicopter program office. In an effort to reduce cost and increase availability, PMA-299 is also the first to implement the Integrated Maintenance Concept Program and is a leader in commercial lease and licensing programs and Contractor Logistics Support Services. Through PMA-299 active participation in the Team Hawk executive management team, joint Army/Navy/Air Force engineering and support programs are developed and implemented which influence operations and support of H-60 aircraft throughout the Department of Defense.

O&S COSTS

Aviation Depot Level Repairables (AVDLR)–*Fleet AVDLR and support supplies*
Fuel–*Fleet petroleum, oil, lubricants (POL) and training expendable stores*
Fleet Replacement Squadron (FRS) Personnel/AVDLR–*FRS personnel, support supplies and AVDLR*
FRS Fuel–*FRS POL and training expendable stores*
Intermediate Costs–*Intermediate repair personnel*
Sustaining Support–*Navy engineering technical service (NETS), contactor engineering technical service (CETS), cognizant field activity (CFA), original equipment manufacturer (OEM)/integrated logistics support (ILS) support, software support activity (SSA), simulator*
Indirect Support–*Base operations, health care, personnel support, health care support personnel, Fleet replacement aviation maintenance personnel (FRAMP)/Naval aviation maintenance training (NAMTRA), HQ/NAVAIR*
Other–*Kits, Kit installation*

FORCE STRUCTURE COSTS

Depot/Integrated Maintenance Concept (IMC)
Service Life Extension Program (SLEP)
Engineering Change Proposal (ECP)/Modification (MOD)/Operational Safety Improvement Program (OSIP)
Parts/Avionics Obsolescence
Test and Evaluation
Trainer Requirements and Upgrades
Support Equipment
Publications Updates
Mandated Requirements

TOC Resources on the World Wide Web

- To learn more about total ownership cost (TOC), visit these web sites:
  NAVSEA Cost Engineering & Industrial Analysis Division TOC [www.navsea.navy.mil/sea017/toc.htm]
  NAVAIR TOC Information Center [www.navair.navy.mil/toc/]
  SPAWAR's on-line guide to R-TOC of SPAWAR systems [rba.spawar.navy.mil:80/toc/]
  Acquisition Reform World Class Practices [www.acq-ref.navy.mil/wcp/toc.html]
- Attend TOC/CAIV training at the Acquisition Center of Excellence (ACE). Tentative dates in 1999: 24-25 Feb, 18-19 May, 28-29 Jul, 27-28 Oct. To sign up, visit the ACE web site [www.ace.navy.mil]
- For information about cost savings initiatives such as Logistics Engineering Change Proposals (LECP) and Commercial Operations and Support Savings Initiative (COSSI), visit the Cost Reduction Initiatives Catalog [www.n4.hq.navy.mil/funding-sources.html] sponsored by the Deputy Chief of Naval Operations (Logistics)
- Visit the Open Systems Joint Task Force site [www.acq.osd.mil/osjtf/] for more information about open systems architecture
- To learn more about DoN tools useful in TOC/Cost as an Independent Variable (CAIV) analyses, visit these web sites:
  Naval Center for Cost Analysis [www.ncca.navy.mil]
  Visibility and Management of Operating and Support Costs (VAMOSC) [www.ncca.navy.mil/vamosc/]
  Cost of Manpower Estimating Tool (COMET) [www.ncca.navy.mil/comet/]
  Operating & Support Cost Analysis Model (OSCAM) [www.ncca.navy.mil/oscam/]
- Visit the Defense Systems Affordability Council (DSAC) web site [www.acq.osd.mil/dsac/] for the latest DoD information about TOC
- Visit the US Air Force R-TOC web site [www.rtoc.drc.com/scripts/default.asp]
- Visit NASA's Cost Technologies for Competitive Advantage [mijuno.larc.nasa.gov/dfc/ctec.html]

What's Inside

Acquisition Reform Update, January 1999 (Volume 6, No. 1)

This issue of the Acquisition Reform Update *kicks off a special series of newsletters, each focused on an acquisition reform theme of special interest to members of the acquisition community. This issue provides information on Total Ownership Cost or TOC, a high visibility, high priority initiative within the Department of Defense—one that is embraced by DoD leaders as a far-reaching, necessary goal. Articles cover topics such as TOC policy and definitions, tools for implementation, program experiences, and TOC information resources. Look for additional TOC stories in the* AR Update *throughout the year. Guest editor for this issue: Capt. Jeanne Vargo. Contributors and reviewers include: Capt. Larrie Cable, Richard Coleman, Richard Collins, Jim Stein, Larry Stoll, Pat Tamburrino, LCdr. Matt Toombs, and Jan Young.*

Managing Editor: Cdr. Michael Skratulia, SC, USN; Editor: Dona M. Lee; Layout and Design: John Pirone. Published monthly by the Assistant Secretary of the Navy (Research, Development & Acquisition) Acquisition Reform Office, 2211 S. Clark Place, Room 924, Arlington, VA 22244-5104. The *Acquisition Reform Update* is available electronically on the AR Homepage at www.acq-ref.navy.mil. Share your lessons learned by contacting the Editor at 703-602-5506 or lee_dona@acq-ref.navy.mil.